wherein a differential thermal analysis conducted on the carbonaceous active material in 10°C increments per minute starting from room temperature and proceeding to 1000°C at atmospheric pressure results in the displaying of at least two exothermic peaks overlapping to form shoulders.

REMARKS

In response to the above-identified Office Action, Applicants amend the application and seek reconsideration thereof. In this response, Applicants amend Claim 1. Applicants cancel Claim 7. Accordingly, Claims 1-6 are pending. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attachment is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Claims Rejected Under 35 U.S.C. § 112

The Office maintains the rejection of Claims 1-6 under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting essential elements. The Office wants to know, for example, if the material is measured in a constant environment. The Office states in Claim 6 that the peak intensity ratio is less than 1, and asks which peak is larger, are they concentration dependent, and the intensity is relative. The Applicants respectfully submit the claims as amended and the claims as they are were not incomplete form omitting essential elements.

Claim 1 has been amended to thoroughly and completely describe the environment in which the material is measured. This amendment has added the phrase describing the differential thermal analysis, "in 10° increments per minute, starting from room temperature and proceeding to 1000°C at atmospheric pressure." The Applicants respectfully submit this complete description of the environment in which the material is measured meets the requirements of 35 U.S.C. § 112, second paragraph. Thus, the Applicants respectfully submit that the Examiner withdraw his rejection of Claims 1-6 under 35 U.S.C. § 112, second paragraph for omitting essential elements of the material measurement.

The Applicants believe the peak intensity ratio referred to by the Office in Claim 6 is actually that mentioned in Claim 5 and will proceed with this understanding. The Office states that Claim 6 is incomplete for omitting essential elements. The peak intensity ratio of Claim 5 is described in the Specification, for example, at page 7 beginning on line 5 and running through line 16. In this section, the peak intensity ratio is clearly defined as the peak of the carbon over the peak of the graphite. The Specification states at page 7, lines 8-10, "if the peak intensity ratio of carbon to graphite exceeds 1, this indicates that there is a large amount of the amorphous carbon ... ." Thus, when the peak intensity ratio which is concentration dependent is preferably less than 1, the graphite peak is the larger peak of the two. Therefore, the Applicants respectfully

request the Office remove its rejection of Claim 5 under 35 U.S.C. § 112, second paragraph, as being incomplete.

Claims Rejected Under 35 U.S.C. § 102

The Office maintains the rejection of Claims 1-6, under 35 U.S.C. §102(b) as being anticipated by Takami (5,244,757). The Examiner states that Takami teaches a lithium secondary battery which comprises spherical particles. The particles have a graphite structural part and an amorphous type part (*See* **FIG.** 2). The carbonaceous material has an exothermic peak of 900°C or less by differential thermal analysis (Col. 5, lines 15-30). No peaks are described for each material, however, materials would have two, separate inherent values based on the graphite material and the non-graphite material. Thus, the claims are anticipated. The Applicants respectfully disagree.

The Applicants respectfully submit the '757 patent and the claims have different technical features with regard to the structure of carbonaceous active materials, preparation methods, and the shapes of exothermic peaks in a differential thermal analysis (DTA).

In the '757 patent, the carbonaceous material has a graphite-like layered structure part (or a graphitoid layered structure part) and a turbulence layered structure part. The layered structure is more disordered than graphite (*See* Col. 3, lines 25-30). The graphite-like layered structure of the carbonaceous material is generally referred to as "graphen sheet" in this art, which does not have a complete crystalline structure. The

turbulence layered structure is more disordered than the graphite-like layered structure. Therefore, the carbonaceous material of the '757 patent is not crystalline graphite but an amorphous carbon. On the other hand, the carbonaceous material of Claim 1, for example, has a crystalline graphite core, evenly coated with an amorphous carbon shell. The carbonaceous material of the '757 patent is made by carbonizing (for example, at 600-1500°C) or graphitizing (for example, above 1500°C) a mesophase small spherical particle or a mesophase pitch fiber (*See* Col. 5, line 31 – Col. 6, line 14). In the preferred embodiment of the '757 patent, the carbonaceous materials are made by heat treatment at 1600°C or less and thus the obtained materials are not crystalline graphite but amorphous carbon. On the contrary, the carbonaceous material of Claim 1 is made by coating a crystalline graphite core with an amorphous carbon.

The carbonaceous material of the '757 patent has an exothermic peak value of °900C or less and the differential thermal analysis. Preferably, the exothermic peak value is in the range of 600-800°C (*See* Col. 5, lines 20-30). However, the carbonaceous material has a single exothermic peak below a temperature of 800°C, mostly between 600 and 700°C (*See* Tables 1-7), since these materials are amorphous carbon. On the other hand, the carbonaceous materials of the claimed invention has at least two overlapping exothermic peaks to form shoulders. The exothermic peaks of the amorphous carbon and

the crystalline graphite are not separate, but overlap to form shoulders (*See* exothermic levels of **FIG.** 1).

Accordingly, the Applicants respectfully submit claims 1-6 do not lack novelty in view of the '757 patent.

In order to evince the difference in shapes of exothermic peaks in a differential thermal analysis between the'757 patent and the present invention, Applicants attach herewith a drawing of the differential thermal analysis results as to mesocarbon microbeads (MCMB), which is prepared in the same manner as in the '757 patent. The MCMB 2510 and 2528 are commercially sold by Osaka Gas Company, was prepared by carbonizing mesophase small spherical particles at the temperature of 1000°C and 2800°C, respectively. *See* '757, Col. 5, lines 48-51. Both the MCMBs have different crystallinity with each other, depending on heat treatment temperature. The MCMB 2510 and the 2528 have both a graphite-like layered structure part (or a graphitoid layered structure part) and a turbulence-layered structure part, and do not have a complete crystalline structure, as in the carbonaceous material of the '757 patent. *See* '757, Col. 3, lines 25-30. However, the differential thermal analysis results of the MCMB 2510 and 2528 display only a single exothermic peak and do not show two or more exothermic peaks, even though the MCMBs have two structures, as above.

If the carbonaceous material is a mixture of more than two MCMBs prepared by carbonizing the different heat treatment temperatures, the differential thermal analysis

results show more than two exothermic peaks. However, the mixture does not display combining a pair of overlapping exothermic peaks to form shoulders. The Office asserted that the '757 patent discloses the carbonaceous material having many core layers covered by other amorphous coatings in **FIG.** 2. However, the carbonaceous material of the patent does not have core shell structure.

Further, as cited in the application as filed, for the active material of Example 1 and Example 2, although an exothermic peak of the amorphous carbon does not occur at a significantly different temperature than where the exothermic peak for this material normally occurs, an exothermic peak of the crystalline graphite occurs at a far lower temperature of approximately 100°C less than normal for this material. This occurrence of the exothermic peak of the amorphous carbon at a temperature slightly higher than normal is the result of the portion of the amorphous carbon undergoing graphitization. With regard to the exothermic peak of the crystalline graphite occurring at a temperature approximately 100°C lower than normal, this is the result of the amorphous carbon and the crystalline graphite being formed in single particles, rather than undergoing simple mixing. Accordingly, the thermal transmission to the crystalline graphite is realized smoothly.

Amended independent Claim 1 recites carbonaceous active material comprising at least one crystalline graphite core and amorphous carbon shell coating the crystalline graphite core and wherein a differential thermal analysis conducted on the carbonaceous

active material in 10°C increments per minute, starting from room temperature and proceeding to 1000°C atmospheric pressure results in the display of at least two exothermic peaks overlapping to form shoulders. In maintaining the rejection of Claims 1-6, the Office stated no peaks are described for each material, however, the materials would have two, separate inherent values based on the graphite material and the non-graphite material. The differential thermal analysis provided by the Applicants demonstrates each material that was fabricated according to the instructions in Takami has a single peak and not a pair of peaks. The absence of the second peak in the Takami reference forming a shoulder with the first peak is fatal to the asserted rejection. Accordingly, Applicants respectfully request withdrawal of the rejection of independent Claim 1.

As Claims 2-6 are dependent on independent Claim 1, they all share the inherent limitations of independent Claim 1. Therefore, the Applicants respectfully submit that dependent Claims 2-6, dependent on patentable independent Claim 1 are not anticipated for at least the same reasons.

CONCLUSION

In view of the forgoing, it is believed that all claims now pending, are in proper form and are neither obvious nor anticipated by the relied upon art of record and are in condition for allowance. A Notice of Allowance is earnestly solicited at the earliest

possible date. If the Examiner believes a telephone conference would be useful in moving the application forward to allowance, the Examiner is encouraged to contact the undersigned at (310) 207-3800.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Dated: 6/22/01

By: _____
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Box AF, Washington, DC 20231 on June 22, 2001.

_____
Nadya Gordon June 22, 2001

VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Twice Amended) A carbonaceous active material comprising:

at least one crystalline graphite core; and

an amorphous carbon shell coating the crystalline graphite core; and

wherein a differential thermal analysis conducted on the carbonaceous active material in 10°C increments per minute starting from room temperature and proceeding to 1000°C at atmospheric pressure results in the displaying of at least two exothermic peaks overlapping to form shoulders.

7. cancelled.